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ALBERT FREDERICK HILL
STUART KIMBALL HARRIS
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VIOLA RAFINESQUII: NOMENCLATURE AND NATIVE STATUS

LLOYD H. SHINNERS

The name *Viola bicolor* Pursh, Fl. Am. Sept. **1**: 175, 1814 (Dec. 1813), was long rejected as a later homonym of *V. bicolor* Gilibert, Fl. Lithuanica **2**: 123, 1782. It has been pointed out, however, that Gilibert used his own peculiar system of descriptive species names consisting of varying numbers of words (Hylander, 1945; McVaugh, 1949). That is to say, he used abbreviated polynomials, many of them short enough to simulate Linnaean binomials, but shown by their association with indubitable polynomials to be really the latter. Hence *V. bicolor* Gilibert does not invalidate *V. bicolor* Pursh, an authentic binomial. For this reason I employed the latter in my *Spring Flora of the Dallas-Fort Worth Area, Texas* (1958), and distributed specimens so named. Unfortunately there does exist a validly published homonym earlier than that of Pursh, not listed in Index Kewensis. This is *Viola bicolor* Hoffmann, Deutschlands Flora (ed. 2) p. 170, 1804. Though only briefly described incidentally to the account of *V. tricolor* L., the name is both valid and legitimate. Hence *V. Rafinesquii* Greene, Pittonia **4**: 9, 1899, remains the correct name for the American plant if considered a species distinct from the European *V. Kitaibeliana* R. & S.

Fernald (1938) considered it so similar to the Old World species that he reduced it to varietal rank as *V. Kitaibeliana* var. *Rafinesquii*. But the morphological similarity is not the whole story. Breeding behavior (specifically, the occurrence of cleistogamy in *V. Rafinesquii* but not in *V. Kitaibeliana*)

and chromosome number (so far as known, from rather few counts) are different. Further, the question of nativity is intimately involved with taxonomic evaluation. For reasons to be detailed later, I believe that *V. Rafinesquii* is indigenous to North America, and that this gives additional support to its recognition as a species distinct from *V. Kitaibeliana*.

Two sources of evidence have been taken to indicate an Old-World origin for our plant. The first, its weedy behavior in the Atlantic States, must be rejected, since a number of field weeds in the East are immigrants, not from the Old World, but from areas farther west in North America. (This is more fully discussed below under item 2, Geography and Ecology.) The second, its close resemblance to members of the *V. Kitaibeliana* complex of southern and eastern Europe, is not at all as conclusive as Fernald (and Wilmott) found it. We have had a number of publications on the so-called amphigean or amphi-Atlantic members of the floras of northeastern North America and northwestern Europe. But our knowledge of the flora of the Southern United States, and more particularly its relationships with the Mediterranean and other floras, is in a primitive state. For the present one suggestive example must suffice. The small umbelliferous genus *Bifora* comprises two species in the Mediterranean region, one in Indo-China, and one in the United States (Texas, Oklahoma, Arkansas). The Mediterranean and American species are extremely similar in general appearance, though differing more markedly in technical morphological details than do *Viola Rafinesquii* and the *V. Kitaibeliana* complex. *Bifora americana* is annual and decidedly weedy. In North Central Texas it is a familiar late-spring wild flower, on "prairies, rocky slopes, and roadsides, limestone areas; very common, often abundant" (Shinners, 1958). In Dallas it is a common weed in vacant lots. It has also been found introduced as a roadside weed in Rusk County, Texas, about 100 miles east of its main range. Nevertheless its native status is beyond question. So close is the parallel with the *Viola Rafinesquii* — *V. Kitaibeliana* situation that the morphological similarities between the latter cannot be taken as proof of common nativity.

The sources of evidence in support of the nativity of *V.*

Rafinesquii in North America are more numerous. While no single one can be taken as conclusive beyond all question (owing in part to the incompleteness of our knowledge, especially of the cytology, breeding behavior, and microforms of *V. Kitaibeliana*), there is remarkable agreement among them. Taken together, I believe that they demonstrate that *Viola Rafinesquii* is a native American species. The arguments may be grouped under six overlapping and closely interrelated headings.

1. EARLY RECORDS. Fernald observed that the earliest record of this species was in 1739 in Gronovius's *Flora Virginica* (actually 1743, since it appeared in the addenda on p. 182 in part 2, published in the latter year). The brief description fits quite well, but there is no information as to exact locality, habitat, or abundance. Pursh, in describing it as *V. bicolor*, said only that it grew "in fields of Pennsylvania and Virginia." This sounds weedy enough, but a field recently cleared from wilderness, and still surrounded by wilderness, is a different thing from fields in the 20th Century. The importance of this point will appear in the discussion of geography and ecology (item 2, below). Barton (1818), treating the area within 10 miles of Philadelphia, reports its occurrence "on the grassy borders of cultivated fields bordering Cooper's creek, Jersey, not far from the Market-street ferry and the Burlington road." Nuttall (also in 1818), without specifying any localities, said "apparently native." Other early reports give stronger evidence of the plant's being native. Elliott (1817) says "Found near the Chatahouchie river, Creek nation, by Dr. Latham," far removed from cultivated fields. His predecessor in the area, Thomas Walter, remaining close to civilization, did not find it. Schweinitz, writing at Salem, North Carolina, in 1821, declared that "this interesting Viola grows with us, along the river bottoms and in retired mountain vallies in such a manner as to leave no doubt, that it is a true native." West of the Mississippi (where the plant is today and has long been far more abundant than to the east) there are likewise early testimonials in support of native status. Reverchon (1880) had no doubt of its being native in Dallas County, Texas. T. C. Porter (1880) quoted Reverchon and added

evidence of its natural occurrence in Colorado: "Mr. Reverchon, in the last number of the GAZETTE, reports it from Dallas county, Texas, and says, 'I am satisfied it is native. I have met it in large patches in remote woods and prairies, sometimes *very far* from settlements.' To this I may add the fact that it has also been collected in Colorado by Mr. Wm. A. Henry, who thus wrote me Aug. 29, 1876 — 'I send you more of the violet. It grows on a warm, dry slope at the mouth of Boulder canon, in a rather inaccessible place. I have seen a few stalks farther up the canon. It blooms very early, along with Leucocrinum montanum, so that it has probably escaped the notice of other collectors. I gathered it three years before in the same place. It *could* have been introduced, but I greatly doubt that seeds of recent introduction could have reached the spot where I found these plants.'" It was collected in Oklahoma ("Indian Territory") in 1875 (*Butler*, no other data; SMU). These early records do not support Fernald's belief that the plant was an introduction from Europe.

2. GEOGRAPHY AND ECOLOGY. Both the geographic area and weedy behavior of *Viola Rafinesquii* are strikingly like those of certain other species of unquestionably native status. *Bifora americana* has already been cited. *Mirabilis albida*, first described in Walter's *Flora Caroliniana*, is rare and local east of the Mississippi River, but common and widespread west of it, especially in Texas and Oklahoma. There it is distinctly weedy, appearing on roadsides, pastures, and old fields. There is an endemic var. *lata* in eastern Texas (Shinners, 1951). *Hedyotis nigricans*, first described from Florida, is abundant and weedy on limestone outcrops, disturbed prairies, and eroding ground in central Texas and Oklahoma, but in eastern Texas and Louisiana and in states farther east it is much less common. *Helenium amarum (H. tenuifolium)* early in the 19th Century occurred as far east as Mississippi. Gray's *Synoptical Flora* (1886) says "Arkansas to Mississippi, Florida, and Texas; becoming a naturalized weed throughout Southern Atlantic States." Undoubtedly its indigenous range centered in Texas, where (in strikingly resemblance to *Mirabilis albida*) there is an endemic var. *badium* (perhaps better treated as a distinct

species). I long ago reported instances of the same species occurring in the same general region in populations of two origins: one native, the other introduced. *Sporobolus neglectus* and *S. vaginiflorus* var. *inaequalis* are present in southern Wisconsin as very localized natives on rocky hillsides and, at the same time, as rapidly spreading railroad weeds largely introduced from elsewhere (Shinners, 1941). This I believe has been precisely the history of *Viola Rafinesquii*. Fernald's argument that because of its weedy behavior and habitats in the eastern states it must have been introduced from Europe cannot be accepted.

The occurrence of the plant in Colorado is not out of order for a native of the Gulf Southwest. *Thalictrum dasycarpum* var. *hypoglaucum*, ranging as far west as British Columbia and Arizona, occurs east to Missouri, Arkansas, and Louisiana (Boivin, 1944). In Texas it occurs only in the eastern third of the state, so that there is a very wide gap in its range. *Brickellia grandiflora*, a Rocky Mountain and Pacific species, is known from a few stations in Arkansas and Missouri (Robinson, 1917), a distribution pattern resembling that of *Viola Rafinesquii* in reverse. *Aster laevis*, a common species of the northeastern United States, also occurs in Colorado, but is absent from a large area in between. (In the northern Rocky Mountain region var. *laevis* is replaced by var. *Geyeri*.)

3. VARIATION. According to Wilmott (quoted by Fernald, 1938, p. 446), one of the major differences between *V. Rafinesquii* and *V. Kitaibeliana* was in the sepals: with strongly ciliate margin in the former, with little or no ciliation in the latter. In north-central Texas and eastern Oklahoma, *V. Rafinesquii* occasionally has completely glabrous sepals, and there are rare intermediates with sepals ciliate only in basal portion or very sparsely. Fernald evidently had insufficient material from this area, for he states that the ciliation is "essentially constant." I have seen specimens with entirely glabrous sepals from Logan, Love, Payne, and Pontotoc counties in Oklahoma, and from Wise County, Texas; with partially glabrous sepals from Cherokee and Delaware counties in Oklahoma, and from Wise County, Texas. It might at first be thought that this weakens the case for taxonomic

distinctness and native status of *V. Rafinesquii*. But there is a difference in sepal shape (see further under item 4, below), so that ciliation is not the only point of difference. The geographic distribution of the glabrous variants is, however, quite significant. If the plant were an alien which had first been introduced into the Atlantic states, one would not expect a minor variation to be thus restricted (though it is remotely possible). But if it is native, and in process of developing endemic races, that is precisely what one would expect. The occurrence of endemic varieties of *Mirabilis albida* and *Helenium amarum* within the Gulf Southwest, mentioned under item 2, are suggestive examples. I believe that, when taken in conjunction with the other items being cited as evidence of native status, the localized glabrous variants of *V. Rafinesquii* strengthen the case.

4. ABSENCE FROM THE OLD WORLD. Fernald and Wilmott were unable to match *V. Rafinesquii* with any forms in the *V. Kitaibeliana* complex. In checking through European floras, I found in Pereira Coutinho's *Flora de Portugal* (ed. 2, p. 500, 1939) *V. Kitaibeliana* var. *Machadiana*, described as "papiloso-aspera." Specimens of *V. Rafinesquii* were sent to A. R. Pinto de Silva of the National Agronomic Station at Sacavem, Portugal, with a request for an opinion as to whether they might be var. *Machadiana*. He very kindly took them to Lisbon (LISE) where, with the help of Dr. L. G. Sobrinho, they were compared with a paratype and other specimens determined by Coutinho. He reports (in letter of 23 December 1956) that "your *V. Ranfinesquii* is different from *Machadiana* and that its original country cannot be Portugal." He found that the main differences were in the basal leaves (with ovate limb and the incisions of the crenate teeth more "opened" in *Machadiana;* with depressed-orbicular limb, the incisions of the crenate teeth not "opened" in *Rafinesquii*) and in the sepals (lanceolate, broader near the base but narrower, and glabrous at the margin or scarcely, sparsely and hispidly ciliate in the upper part and near the base in *Machadiana;* sepals constricted as a shoe and regularly hispidly and strongly ciliate in *Rafinesquii*). He adds "I have observed also some specimens of *V. Kitaibeliana* (determined as so!) from South Spain (Sierra Nevada)

(LISE). These have sepals with a little more cilia but they are still different from your *Rafinesquii.*" The opinion of Fernald and Wilmott that *V. Rafinesquii* must be some very rare and local European race remains without proof.

5. CLEISTOGAMY. Gershoy (1934, p. 13) states briefly that only *V. Rafinesquii* in the sec. *Melanium* produces cleistogamous flowers. I have observed apparent cleistogamy in the species in northeastern Texas, but rarely. Color variations in roadside colonies suggest, however, that more careful observation might show it to be fairly common. Some colonies show considerable variation in flower color, while others — or certain patches within extensive stands — are perfectly uniform. This is what one might expect if the plants reproduce by both cross- and self-pollination. I have no information about the European members of the section beyond Gershoy's statement. He remarks that he considers *V. Rafinesquii* to be "functionally biennial"; as known to me, it is a winter annual. He considers the three forms of *V. Kitaibeliana* for which chromosome counts were made as annual.

6. CHROMOSOME NUMBER. For *V. Kitaibeliana*, Gershoy reports haploid numbers of 7, 18, and 24. For *V. Rafinesquii* he gives 17, but does not state the number of counts or source of material on which this figure was based. At my request, Dr. Walter H. Lewis of Stephen F. Austin State College, Nacogdoches, Texas, counted two plants growing wild on his campus and found the diploid number to be 34, thus confirming Gershoy's count for this species. Additional counts from different localities are needed, both in America and in Europe, before we can be reasonably certain that the same number is not found on both sides of the Atlantic, but the data so far available certainly fall into the same pattern as other lines of evidence.

It is concluded that *Viola Rafinesquii* is a native American plant with its major area in northeastern Texas, Oklahoma, and Arkansas, with outlying scattered stations farther east and in Colorado, that it has increased and spread as a weed since settlement, and that, although very similar to members of the *V. Kitaibeliana* complex of the Old World, it is preferably treated as a distinct species, the weak morphological

differences being supported by differences in breeding behavior and chromosome number, as well as by geographic remoteness.

I wish to express my very deep appreciation to A. R. Pinto de Silva for his great trouble in comparing specimens, making tracings and microfilms, and supplying transcripts of all the Portuguese literature dealing with the *Viola Kitaibeliana* group; to Dr. L. G. Sobrinho for his assistance in checking the material at Lisbon; to Dr. Walter H. Lewis for the chromosome counts of *V. Rafinesquii;* to Dr. U. T. Waterfall for the loan of specimens in the Herbarium of Oklahoma State University; and to Dr. G. B. Van Schaack, Librarian, Missouri Botanical Garden, for a copy of the original description of *V. bicolor* Hoffmann. — SOUTHERN METHODIST UNIVERSITY, DALLAS 22, TEXAS.

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THE GENUS OLEANDRA OF COSTA RICA

EDITH SCAMMAN

This paper is the third of my studies of a genus of Costa Rican ferns, and follows the same plan as the previous ones on *Adiantum*[1] and *Pteris*.[2]

Again I want to express my gratitude to Dr. Leslie R. Holdridge of San José for his great help during my seasons of collecting in Costa Rica, and to Dr. Rolla M. Tryon of Harvard University for his advice and assistance so generously given in the preparation of these papers.

The drawings have been prepared especially for this article by Miss Ruth Hsu.

OLEANDRA Cavanilles

Oleandra is an isolated genus and is considered to be an old one. It is restricted almost entirely to the Tropics with numerous species in Asia to Polynesia, Africa, West Indies and Central and South America. The fronds are simple and entire, usually lanceolate-elliptical and firm, often lustrous in texture resembling the leaves of the Oleander, whence the name.

In some species the rhizome is stout (with appressed scales) and more or less erect, producing a shrubby growth habit. In others it is more slender (with spreading scales) and twines about tree trunks. The stipes are articulate (the portion below the joint being called a phyllopodium) and short or long, solitary or clustered. Veins are free (Fig. 3),

[1]Contrib. Gray Herb. 187: 3-22. 1960.
[2]Rhodora 63: 194-205. 1961.

and the round dorsal sori are borne irregularly in a row or rows, generally near the costa (Fig. 1), with orbicular or reniform indusia. The scales on the costa of some species are characteristic and serve as an aid to identification.

The treatment and key have been adapted from Maxon, Contr. U. S. Nat. Herb. 17: 392-398. 1914.

KEY TO THE SPECIES

a. Rhizomes slender, the spreading scales not entirely concealing the rhizome (Fig. 2); phyllopodia usually long (0.5-3 cm.), slender and naked (except at the base), like the upper portion of the stipe. b.
b. Rhizomes brownish with a rather dense covering of persistent scales; leaf-tissue subcoriaceous. ..... 1. *O. articulata.*
b. Rhizomes pruinose with fewer, more laxly spreading, deciduous scales; leaf-tissue membrano-papyraceous. ..... 2. *O. Bradei.*
a. Rhizomes stout, pruinose, the appressed scales strongly imbricate, completely concealing the rhizome (Fig. 6); phyllopodia short (rarely to 0.5 cm. or a little more), stout and scaly at least at first, like the rhizome. c.
c. Stipes 0.5 to 2 cm. long above the articulation, the fronds variable in size and shape, narrowly or abruptly cuneate at base, minutely glandular-pubescent beneath, but soon glabrous; indusia not ciliate, nearly glabrous. ..... 3. *O. costaricensis.*
c. Stipes wanting or nearly so above the articulation, never more than 0.5 cm. long, the frond tapering downward to a long-attenuate, alate base, minutely pubescent; indusia long-ciliate and pilose. ..... 4. *O. decurrens.*

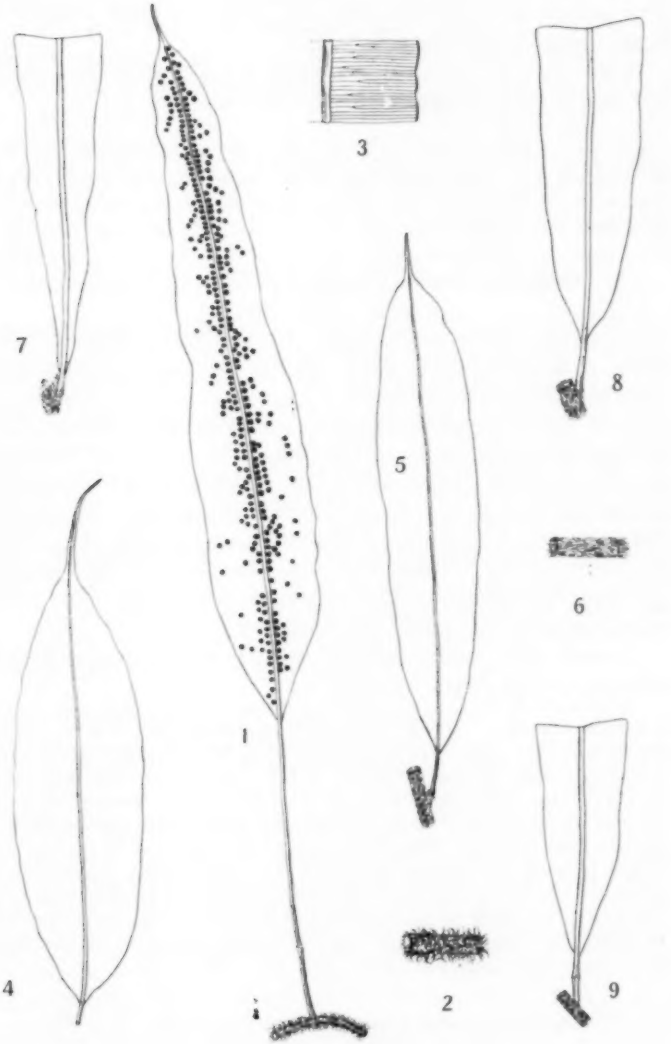
1. **Oleandra articulata** (Swartz) Presl, Tent. Pterid. 78. 1836. FIGS. 1-3.

Oleandra nodosa (Willd.) Presl, Tent. Pterid. 78. 1836.

Of the four species of Oleandra collected in Costa Rica this is the only one of widespread distribution, occurring in the West Indies and Central and South America; two of the others seem to be endemic to Costa Rica.

Climbing up the trunks of trees in the forest, the wide-creeping, brownish rhizomes are densely covered with spreading, ferruginous, linear-filiform scales with a dark-centered peltate base. The fronds, lance-linear to oblong-acuminate, caudate at the apex, are glabrous and shining.

FIG. 1-3. *Oleandra articulata* (from *Seamman 7600*): Fig. 1. leaf and portion of rhizome, × ½. Fig. 2. portion of rhizome, × ¾. Fig. 3. venation, × ¾. FIG. 4. *O. Bradei* (from *Seamman & Holdridge 7886*): lamina, × ½. FIG. 5-6. *O. costaricensis*



(from *Scamman 7604*): Fig. 5. leaf and portion of rhizome, × ½. Fig. 6. portion of rhizome, × ¾. Fig. 7. *O. decurrens* (from *Brenes 14240*): portion of leaf and rhizome, × ¾. Fig. 8. *O. panamensis* (from *Pittier 5322*): portion of leaf and rhizome, × ¾. Fig. 9. *O. guatemalensis* (from *Tuerckheim 983*): portion of leaf and rhizome, × ¾.

The costae are elevated beneath, with cordate, deltoid to long triangular, castaneous scales.

Guatemala to Panama, to Bolivia and Brazil; West Indies. In moist forests from sea level to 1200 m.

Specimens seen: Cocos Island (Pacific): *Waldo L. Schmitt 132* (US), *A. Stewart 239* (GH). HEREDIA: Finca La Selva, Río Puerto Viejo, *Scamman & Holdridge 7884* (GH). CARTAGO: San Juan del Norte, *Scamman 7600* (GH).

2. **Oleandra Bradei** Christ, Bull. Soc. Bot. Genève II, 1:231. 1909. FIG. 4.

Based on *Oleandra nodosa*, var. *caudata*, Christ, Bull. Herb. Boiss. II, 4:964. 1904. Type: Talamanca, Costa Rica, 1000 m., 1898, *Pittier 12699*.

Oleandra Bradei has been collected often in Costa Rica, especially in the region of La Palma. The whitish rhizomes and their fewer, more deciduous, reddish-brown, lanceolate scales distinguish this from the former species. The fronds are generally wider and of thinner texture than those of *O. articulata*. The often ovate-elongate blade, with undulate margins is variable in size and shape. The costa in the specimens seen, has substantially no scales.

Known only from Costa Rica. On mossy tree trunks at edge of forests from 300 to 2500 m.

Specimens seen: LIMON: Los Diamantes, Rubber Plant Station, *Scamman 7041* (GH); Hamburg Finca, on the Río Reventazón below Cairo, *Standley & Valerio 48691* (US.). ALAJUELA: Zarcero, *Austin Smith 48/194* (US); La Palma de San Ramón, *M. Quiros 264* (GH), La Palma near San Ramón, *A. Brenes 5113* (US). SAN JOSE: Las Nubes, Jan. 30, 1938, *Wm. Knight* (US), *Scamman & Holdridge 7885* (GH); La Palma, *Standley 33066* (GH, US), *38188* (US), *Maxon 389,404* (US), *H. E. Stork 420* (US), *H. Berlolini 608* (US), *Scamman 7601* (GH); On the Road to La Hondura, *Maxon & Harvey 7904* (GH, US), *Scamman & Holdridge 7886* (GH), *Standley 37911* (US). CARTAGO: Navarrito, *Lankester 750* (US).

3. **Oleandra costaricensis** Maxon, Contr. U. S. Nat. Herb. 17:397. 1914. FIGS. 5-6.

Type: La Palma, Costa Rica, 1459 m., September 1898, *A. Tonduz 12551* (US).

This species, the most common in Costa Rica, belongs to

the second group of Oleandras with the stout, woody rhizome (covered with closely appressed scales) growing more or less erect on forest trees or on bushy banks. The fronds are at first minutely glandular-pubescent beneath, lustrous in texture and often iridescent. The sori are rather large with nearly glabrous indusia. The scales on the costa are characteristic, reddish brown, deltoid to ovate-lanceolate, and deeply lacerate.

Costa Rica, also Colombia. On roadside banks or climbing high on trees in moist forests, the stems sometimes supported by other plants, from 600 to 1700 m.

Specimens seen: 1901-1905, *Wercklé* (US); Nov. 1886, *J. J. Cooper* (GH, US). LIMON: On hills near Moravia, *Williams 16181* (US). HEREDIA: Cinchona, *Scamman 7604* (GH). SAN JOSE: La Palma, *Tonduz 12550* (US), *Standley 38229* (US), *Scamman 7602* (GH); La Hondura, *Standley 36210* (US); Vicinity of El General, *Skutch 2817, 2961* (GH, US). CARTAGO: Orosi, finca del Dr. Valverde, *A. Brade 16836* (US), Vicinity of Orosi, *Standley 39611* (US); Tapanti (Orosi), *R. Torres 185* (US), *Scamman & Holdridge 7887* (GH); Juan Viñas, *Cook & Doyle 222* (US), *Holdridge 7603* (GH); La Estrella, *Standley 39259* (GH, US), *39393* (US); East Turrialba, Aug. 9, 1924, *A. Alfaro* (GH, US); El Muñeco, on Río Navarro, *S. & R. Torres 50991* (US); La Fortuna entre Cervantes et Pacayas, March 1906, *Biolley* (US); Pejivalle, *Stork 2819* (US); San Isidro de Cartago, *Stork 4529* (US). GUANACASTE: La Tajana, north of Tilarán, *Standley & Valerio 45928* (US), El Silencio near Tilarán, *Standley & Valerio 44702* (US).

4. **Oleandra decurrens** Maxon, Contr. U. S. Nat. Herb. 17 :396. 1914. FIG. 7.

Type: El General, Costa Rica, January 1897, *Pittier 10649* (US).

This rare species has the stipe almost lacking, never more than 0.5 cm. long, the linear-oblanceolate, pubescent fronds tapering gradually downward to a slender, long-attenuate, alate base. The indusia are small and long-ciliate, and the many scales on the costa are linear-lanceolate, long-attenuate and bright brown. The leaf-tissue is rigidly herbaceous.

Known only from Costa Rica. From 1100 to 1500 m.

Specimens seen: ALAJUELA: Des collines de Piedades près San Ramón, *A. Brenes 14240* (GH, US). SAN JOSE: El General, *Pittier 10649* (US).

One variety described from Costa Rica has not been

placed. Although described under *O. trinitensis* it is probably *O. costaricensis.*

O. trinitensis Maxon, var. *subcostaricensis* Suesseng. & Losch, Mitteil. Bot. Staats. München **1**: 23. 1950. Type: Turrialba, Costa Rica, 1500 m., June 18, 1932, *Kupper 1613,* not seen.

Two other species, *Oleandra guatemalensis* Maxon and *Oleandra panamensis* Maxon grow in Guatemala and in Panama to Colombia respectively. These might possibly occur in Costa Rica, although no specimens of them have been seen from there.

O. panamensis (Fig. 8) differs from the related *O. decurrens* in having the lamina base rather abrupt and the leaf distinctly stipitate above the articulation. In *O. decurrens* the lamina base is gradually reduced and the leaf is subsessile or nearly so above the articulation.

O. guatemalensis (Fig. 9) has long slender phyllopodia like the upper portion of the stipe and small distinctive heart-shaped, almost concolorous scales at the sides of the costa. It differs in these characters from *O. costaricensis* which has the phyllopodium like the rhizome and more elongate, deeply lacerate costal scales. — GRAY HERBARIUM, HARVARD UNIVERSITY.

VASCULAR PLANTS ON THE CINDER CONE OF PARICUTIN VOLCANO IN 1960[1]

JOHN H. BEAMAN

Plants growing on the cinder cone of Parícutin Volcano in 1958 have been reported previously (Beaman, 1960). The present study is based on collections made there on September 8, 1960, two years after the first visit and approximately eight and a half years after volcanic activity ceased. Voucher specimens are filed in the Herbarium of Michigan State University. I am indebted to Dr. R. L. Hauke, Dr. R. McVaugh, Dr. T. R. Soderstrom, and Dr. W. H. Wagner, Jr. for help in the determination of certain species as indicated below.

Ascent and descent of the cone were made on the southwest side. The entire circumference of the rim and both

[1]Supported by Grant G-9045 from the National Science Foundation.

crater vents were examined. The physical features of the cone were about the same in 1958 and 1960. A description and illustrations of the cone, based on a 1957 visit, have been published by Segerstrom (1960).

EQUISETACEAE.

EQUISETUM HYEMALE L. var. AFFINE A. A. Eat. *(Beaman 4417)*. The determination of this species was made by Dr. Hauke. Several stems were present on the northwest rim. These were relatively small, and strobili had not been produced.

POLYPODIACEAE.

PELLAEA TERNIFOLIA (Cav.) Link var. TERNIFOLIA *(Beaman 4414)*. Only one small plant, growing on the northeast wall of the crater, was found. This is the area where most of the ferns were collected during the 1958 visit, but not where *P. ternifolia* was previously located. The 1960 collection was sterile, but one of the plants obtained in 1958 had produced sporangia.

PITYROGRAMMA TARTAREA (Cav.) Maxon *(Beaman 4415, 4423, 4431)*. This was one of the most frequently observed species on the cone. The determination of collection *4415*, which includes only very young plants, was suggested by Dr. Wagner. The previously reported undetermined juvenile fern *(Beaman 2408D)* may also be this species. Both of these collections are from the northeast wall of the crater. Collection *4423* from the northwest rim of the cone includes plants with sporangia. Collection *4431*, from near a fumarolic vent on a small lava outcrop at the southwest base of the cone, is of plants at about the same developmental stage as those in collection *4423*.

GRAMINEAE.

DIGITARIA SANGUINALIS (L.) Scop. *(Beaman 4412)*. Several plants were found in flower on the northeast saddle. In 1958 this area was devoid of plants except for one dicot seedling.

CALAMAGROSTIS MCVAUGHII Sohns *(Beaman 4426, 4429)*. The determination of collection *4429* was made by Dr. Soderstrom. In 1958 this species (previously called *C. pringlei*) was found on a lava flow near the east base of the cone. Plants with young inflorescences were well established in 1960 on the northwest rim *(4426)* and at the southwest base near a fumarolic vent on a small lava outcrop *(4429)*.

SPOROBOLUS CONFUSUS (Fourn.) Vasey *(Beaman 4410)*. Flowering and fruiting plants of this annual species were abundant near the east peak in a local area which was kept moist by a fumarolic vent.

SALICACEAE.

SALIX HARTWEGII Benth. *(Beaman 4423)*. This collection was made at the southwest base of the cone near a fumarolic vent on a small lava outcrop. Several plants were also observed on the rim of the cone. Eggler (1959) noted that *S. hartwegii* was one of only two species present in 1950 in volcanic ash on the adjacent north slopes of Cerro Tancítaro.

PHYTOLACCACEAE.

PHYTOLACCA ICOSANDRA L. *(Beaman 4424)*. Several fruiting specimens were found near the west peak. This collection makes it possible to determine the previously reported undetermined dicot seedling *(Beaman 2404)* as the same species.

ERICACEAE.

GAULTHERIA ODORATA Willd. *(Beaman 4408)*. A single plant, about 22 cm. high and with one inflorescence, was found near the east peak. Presumably this shrub had attained its full development in two years, because it was not observed during the 1958 visit.

HYDROPHYLLACEAE.

WIGANDIA KUNTHII Choisy *(Beaman 4420)*. The identity of this collection was suggested by Dr. McVaugh. Three seedlings were found on the northwest rim of the cone.

COMPOSITAE.

ASTER SUBULATUS Michx. var. AUSTRALIS (A. Gray) Shinners *(Beaman 4411, 4438)*. Since 1958 this species (previously called *A. exilis*) has become well established in the area near the east peak. No flowering plants were found in 1958, but in 1960 many of the plants were in flower. One tiny seedling (collection *4438*, probably of this species) was found on the southwest side of the cone about 40 m. below the rim.

BACCHARIS GLUTINOSA Pers. *(Beaman 4428)*. A fairly large, sterile plant was found near a fumarolic vent on a small lava outcrop at the southwest base of the cone. Large flowering specimens *(Beaman 4392)* were collected about three kilometers east of the cone, where the plants were growing in volcanic ash.

CONYZA CANADENSIS L. *(Beaman 4413)*. One small flowering specimen was collected in the northeast saddle on the rim of the cone.

CONYZA CORONOPIFOLIA H. B. K. *(Beaman 4406)*. This species was obtained from near the east peak where it was also collected in 1958. The one plant was in flower and of about average size for the species.

ERIGERON EXILIS A. Gray in S. Wats. *(Beaman 4422)*. One depauperate, but flowering, specimen was found on the northwest rim of the cone.

EUPATORIUM PAZCUARENSE H. B. K. ? *(Beaman 4427, 4432, 4437)*. This species was found at three places on the cone. Two plants were located on the northwest rim *(4427)*; several plants were found at the southwest base on a small lava outcrop *(4432)*; and a small seedling was obtained on the southwest side about 40 m. below the rim *(4437)*.

GNAPHALIUM AMERICANUM Mill. *(Beaman 4407, 4430)*. Two plants of collection 4407, both in flower, were obtained near the east peak. A larger population *(4430)* was found at the southwest base near a fumarolic vent on a small lava outcrop.

GNAPHALIUM SEMIAMPLEXICAULE DC. *(Beaman 4425, 4436)*. One small, sterile plant *(4425)* was located near the west peak. Two other plants *(4436)*, in poor condition, were present on the southwest side of the cone about 40 m. below the rim. Specimens of this species collected in 1958 were more mature and in better condition that those found in 1960.

HETEROTHECA INULOIDES Cass. var. ROSEI Wagenknecht *(Beaman 4416)*. One vigorous rosette was found on the northwest rim of the cone. A flowering specimen *(Beaman 4404)* was collected near San Juan Viejo (formerly San Juan Parangaricutiro) in soil with a high volcanic ash content.

SONCHUS OLERACEUS L. *(Beaman 4421)*. A very small seedling was found on the northwest rim of the cone, but a flowering specimen *(Beaman 4389)* was collected on a volcanic ash deposit near the southwest base of the cone.

UNDETERMINED MATERIAL.

Two additional species *(Beaman 4418* and *4419)* were obtained on the northwest rim of the cone. Collection *4418* consists of one rosette, and *4419* is of two small, caulescent plants. Both may be species of the Compositae.

DISCUSSION

The vegetation on the cone of Parícutin Volcano was much denser and more species were present in 1960 than in 1958. In 1960 the cone flora was made up of 22 species in eight families and 20 genera, while 14 species in six families and 11 genera were present in 1958. Six species *(Pityrogramma calomelanos, Pteridium aquilinum* var. *feei, Pinus montezumae ?, Aegopogon cenchroides, Buddleia cordata,* and *Gnaphalium attenuatum)* reported from the 1958 visit were not relocated in 1960. The number of species of ferns decreased from five to two. The Gramineae increased from one to three species, although the one species found in 1958 was not recollected in 1960. The Compositae, with 10 species in 1960, had doubled its representation in the two-year period. The two woody species *(Pinus montezumae ?* and *Buddleia cordata)* found in 1958 were not relocated in 1960, but they were replaced by three other woody species *(Salix hartwegii, Gaultheria odorata,* and *Wigandia kunthii)*.

In 1958 the moisture from fumarolic vents appeared to be very important in enabling plants to become established on the cone. At that time a majority of the species were concentrated near such areas. In 1960 some of the most vigorous growth was near fumarolic vents around the east peak and at the southwest base. Many plants, however, were also found on the rim of the cone in areas away from fumarolic vapors. Coarse rubble on the outside of the cone and on the crater walls apparently is still not a habitat which vascular plants have been able to successfully invade.

In view of the species present in 1960, it still appears that dispersal by wind is the most important method of transport of propagules to the cone. Nevertheless, animal agencies, possibly birds, were very likely involved in the transport of *Phytolacca icosandra* and *Gaultheria odorata*, species with fleshy fruits. Animals may also be responsible for the dispersal of the grasses, particularly of *Digitaria sanguinalis*, which produces relatively large caryopses. The *Equisetum*, Polypodiaceae, *Salix*, *Wigandia*, and Compositae probably were all dispersed by wind.

Nearly half of the species found on the cone are weedy. These are *Digitaria sanguinalis*, *Phytolacca icosandra*, *Wigandia kunthii*, *Aster subulatus* var. *australis*, *Conyza canadensis*, *C. coronopifolia*, *Gnaphalium americanum*, *Heterotheca inuloides* var. *rosei*, and *Sonchus oleraceus*. It is not surprising that species which are well adapted for colonizing other disturbed and open habitats should be among the first plants to become established on the cone.

The species most vigorous in appearance and numerous in individuals were *Pityrogramma tartarea*, *Calamagrostis mcvaughii*, *Digitaria sanguinalis*, *Sporobolus confusus*, *Salix hartwegii*, *Phytolacca icosandra*, *Aster subulatus* var. *australis*, and *Gnaphalium americanum*. All of these species except *Salix hartwegii* had produced reproductive structures. Seven of the species which were present on the cone in 1958 were also found in 1960, thus demonstrating that these pioneer species were able to maintain themselves on the cone during the two-year period. Four species, *Pityrogramma tartarea*, *Phytolacca icosandra*, *Aster subulatus* var. *australis*, and *Eupatorium pazcuarense ?* have become more abundant since 1958. — DEPARTMENT OF BOTANY AND PLANT PATHOLOGY, MICHIGAN STATE UNIVERSITY, EAST LANSING.

LITERATURE CITED

BEAMAN, J. H. 1960. Vascular plants on the cinder cone of Parícutin Volcano in 1958. Rhodora **62**: 175-186.

EGGLER, W. A. 1959. Manner of invasion of volcanic deposits by plants, with further evidence from Parícutin and Jorullo. Ecological Monographs **29**: 267-284.

SEGERSTROM, K. 1960. Erosion and related phenomena at Parícutin in 1957. Geol. Surv. Bull. 1104-A. 1-18.

A WEEDY CRUCIFER AGAIN REACHES NORTH AMERICA. — The identification of a roadside weed from Yancey County, North Carolina was not difficult, but determining the correct name for the plant turned up several conflicts and proved to be a small "tour de force" through the literature. The plant, originally described as *Brassica cheiranthos* by Villars,[1] is apparently native in western, central and southern Europe. If the species were to be retained in *Brassica*, as was done for many years, there would be no nomenclatural problem. The plant would be referred to as *Brassica cheiranthos* Vill. However, most of the recent works dealing with this species place it in another genus. O. E. Schulz[2] not only revived the invalidly published generic name *Brassicella* of Fourreau[3] but in addition appears to have misapplied the name *Brassica erucastrum* L. to the species here considered. At least, this is essentially the conclusion of Dandy[4], who transferred *Brassica cheiranthos* Vill. to *Rhyncosinapis* to replace the name *R. erucastrum* (Vill.) Dandy earlier provided for the same taxon.[5] I do not know whether Dandy went over the same literature and specimens that were examined by Pugsley[6] but he reached the same conclusion, that the names *Brassica cheiranthos* and *B. erucastrum* do not apply to the same species as was assumed to be the case by Schulz. Pugsley points out that "the sheet in the Linnean Herbarium labelled "7. erucastrum?" by Linnaeus, contains two small plants of *Rhaphanus Raphanistrum* L. that look much more like *Erucastrum obtusangulum* than *Brassica cheiranthus.*"

Assuming for the moment that the species is not to be retained in *Brassica* and is not properly referrable to *Sinapis* or any other of the long established generic segregates of *Brassica*, we come back to the two divergent treatments of Schulz and Dandy. It is clear that *Brassicella*, published merely as a nomen in Fourreau's work, has to be dated from Schulz and was illegitimate when proposed because *Rhyn-*

[1]Prosp. Pl. Delph. 40. 1779.
[2]Engler's Bot. Jahrb. 54: Beibl. No. 119. 52-3. 1916.
[3]Ann. Soc. Linn. Lyon 16: 330. 1868.
[4]Watsonia 4: 41-42. 1957.
[5]Clapham, Tutin and Warburg, Fl. Brit. Isles 158. 1952.
[6]Journ. Bot. 74: 326. 1936.

cosinapis had been validly published by von Hayek[7] in the meantime. Schulz was wrong both as to the generic and to the specific names. We agree then, with Dandy, that the species is to be referred to by the name *Rhyncosinapis cheiranthos* (Vill.) Dandy.

The specimen that evoked the above was collected by Harry E. Ahles, No. 42855, with J. A. Duke, June 7, 1958, roadside, 1.8 miles southwest of Burnsville on N. C. 197, Yancey County, North Carolina. It was distributed as *Diplotaxis muralis*. This is not the first time *Rhyncosinapis cheiranthos* has reached the North American continent. Nearly one hundred years ago when Addison Brown was combing the ballast fillings around New York City for new introductions he found it in Hoboken, New Jersey.[8] I have examined Brown's specimens and they are correctly identified. At first, he used the name *Brassica monensis*, but later made the correction to *B. cheiranthos*. This species apparently did not gain a continuing foothold in our flora at that time and we have seen no evidence of its presence from then until that provided by the North Carolina collection cited above. The fact that this came from a roadside habitat far inland from a coastal port indicates that the species may well be on its way to becoming a part of our weedy flora. — REED C. ROLLINS, GRAY HERBARIUM OF HARVARD UNIVERSITY.

AN ALBINO FRUITED FORM OF GAULTHERIA PROCUMBENS

On September 11, 1958, I stopped my car in a temporary parking place opposite the Naval Facilities Station at Tom Nevers Head, Nantucket Island, Mass. As I left the car, I noticed that the front wheels were on a luxuriant bed of *Gaultheria procumbens* L. Intrigued by the robust appearance of the plants, I made a closer inspection of them. To my surprise, I discovered that the fruits were a creamy white with many of them being almost pure white.

Outside the perimeter of this bed of albino-fruited plants, there was a far greater area matted solidly with the usual red-fruited form. The fruits, flowers, and foliage of these plants were considerably smaller by comparison. Several

[7] Beih. Bot. Centralbl. 27: 260. 1911.
[8] Bull. Torrey Bot. Club 7: 123. 1880.

finger-like drifts of the more robust albino-fruited plants extended well into the area of the red-fruited plants showing that soil conditions played no major part in the dwarf condition of the latter.

Gaultheria procumbens L., form. **leucocarpa** MacKeever. Differt ab planta typica in fructibus albis. This form is similar to the species except for its albino fruits.

The type specimen, N309, was collected by *Frank C. MacKeever* at Tom Nevers Head, Nantucket Island, Mass., August 12, 1959, and is deposited in the herbarium of the New York Botanical Garden.

It may be of interest to write something of the history of this plant. My first encounter with it took place on my first visit to the island and I had then no intentions of doing a floristic study of the plant-life there. For that reason I collected only enough material to serve as voucher specimens, the two specimens being given the reassigned collection number N1 and deposited in the herbarium of the New York Botanical Garden, and in the herbarium of the Museum of Natural Science, Nantucket, Mass.

Upon realizing that this plant was a new form, I wished I had more sets of the original collection to present to other institutions. Therefore, on August 12, 1959, I recollected it in order that a set of this number, N309, could be presented as an isotype to Gray Herbarium, Cambridge, Mass.; Department of Agriculture, Plant Research Institute, Ottawa, Ont., Canada; and Instituto de Botanico, São Paulo, Brazil.

The sets of N309, now deposited in the above mentioned institutions, were collected from the same group of plants as those of N1. However, the fruits of N1 are somewhat more mature than those of N309, as N1 was collected later in the season.

On September 21, 1960, I took the Nantucket Garden Club for "a nature hike". We visited the station of f. *leucocarpa* only to find great piles of dirt and debris spread over the colony. A few albino-fruited plants were found, but the fruits possessed somewhat of "a blush" on the more exposed surfaces. These "blushed" fruits were not as white as those of the original collections. However, it does seem certain that the albino fruited plants were not completely destroyed.

— FRANK C. MACKEEVER, NEW YORK BOTANICAL GARDEN.

Corrections in Reports of the Committee on Plant Distribution

In the Fourteenth Report (Rhodora 63: 47-55) the following corrections resulting from what we now consider to be misidentifications should be noted: —

Arabis canadensis L. Delete the + sign in the column for Maine. The reported occurrence of this species in Maine was based on the misidentification of a depauperate specimen of *Hesperis matronalis* L. in young fruit collected on July 3, 1901, by Kate Furbish at Skowhegan in Somerset County. The nearest and otherwise most northeasterly station for *A. canadensis* so far discovered is some one hundred fifty miles to the southwest in Rockingham County, New Hampshire.

Ribes rotundifolium Michx. Delete the + sign in the New Hampshire column. A specimen from Crawford Notch in the White Mountains, well north of the normal range for the species, collected by H. H. York on July 18, 1919, labeled *R. rotundifolium*, proves to be *Ribes hirtellum* Michx.

Ribes cynosbati L. (Page 53, Line 17 *et seq.*) Delete the second sentence and substitute: It occurs sparingly in western Maine south of 45° and is frequent elsewhere in New England west of a line drawn from Strong in Franklin County, Maine, through Jaffrey in Cheshire County, New Hampshire, Hartland in Hartford County, Connecticut, to New Milford in Litchfield County, this line forming a well-marked boundary with the exception of a single station in southeastern New Hampshire and two stations in north-central Connecticut.

Three errors in earlier Reports have been pointed out by Hodgdon and Steele[1]. Accordingly, the following plants should be excluded from the New Hampshire list: *Juniperus horizontalis* Moench. (Fifth Report, Rhodora 28: 43). *Carya tomentosa* Nutt. (Eleventh Report, Rhodora 58: 127). *Betula papyrifera* Marsh. var. *commutata* (Regel.) Fern. (Eleventh Report, Rhodora 58: 128). — R. C. Bean, A. F. Hill and R. J. Eaton, committee on plant distribution.

[1]Hodgdon, Albion R., and Frederick L. Steele — The Woody Plants of New Hampshire. S. B. 447. Agr. Exp. Sta. U. of N. H., Durham, N. H., 1958.

A BOTANICAL ATLAS OF THE DANISH FLORA[1] — This fine illustrated work contains figures, drawn from living material, of most of the species of Bryophyta and vascular plants of the Danish flora. The first volume, with 515 plates, is devoted to the Angiosperms and the second one, with 240 plates, to the Bryophyta, Pteridophyta and Gymnosperms. One to several species are illustrated on each plate. The whole plant, or a portion of it, is presented and in addition some of its more significant details.

The second volume has a parallel English text and especially in this volume there is an introductory description and discussion of the larger families or groups. This text gives a valuable account of the life-history of the group and the seasonal development of the different structures. The ecology of the group is discussed and closely correlated with its life-history.

The phyletic theory presented at the end of the second volume is somewhat novel in presenting the Angiosperms as triphyletic. Each of the three lines is considered to have evolved from separate groups of the Bryophyta through groups of the lower vascular plants. This phylogeny is developed chiefly through a concept of the conifer cone and the *Equisetum* and *Selaginella* strobilus as primitive kinds of "flowers". While this theory will be of interest, its morphological basis may not be acceptable to many.

These volumes are not only useful as an iconography of the principal elements of the Danish flora, but also for information about the smaller structures of the species (stamens, ovaries, seed, peristome, spores, etc.) and about their ecological life-history as well. — ROLLA TRYON, GRAY HERBARIUM, HARVARD UNIVERSITY.

[1]Botanisk Atlas, Danmarks Daekfroede Planter, by Olaf Hagerup and Vagn Petersson. vol. 1. pp. 1-550. 1956. vol. 2, pp. 1-299. 1960. 4°. Ejnar Munksgaard. København.

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IMPORTANT NOTICE

to members, subscribers and librarians

Beginning with Volume 64 to be published in 1962, **Rhodora** will become a quarterly journal. It is anticipated that Volume 64 and subsequent volumes will contain approximately the same number of pages as previously published recent volumes. It will be the aim of the editors to have each quarterly number consist of 96 pages, including the cover. The above change does not imply any other changes in editorial policy.

The Editors